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EPAct Program Update for Chet France

Module A – Status and Budget

Bring Ines

January 23, 2008

1) How much can she scrape together ~~to~~ w/o asking for more $

Preliminary information – not for release outside EPA

2) how can we pare back w/o damaging integrity

3) what's bare min. we need

Status of Testing

- Phase 1 testing complete
  - 75F testing of 19 vehicles on 3 fuels (E0, E10, E15)
  - Data was received by EPA, briefing materials were presented on primary findings
- Interim FTP-cycle testing complete
  - 75F testing of 6 vehicles on 3 fuels (E0, E10, E15)
  - Data was received by EPA, this briefing contains primary findings
- Phase 2 testing underway
  - 50F testing of 19 vehicles on 3 fuels (E0, E10, E15)
  - Fuel 17 and 18 testing were recently completed
  - Fuel 19 testing has begun, to be completed by 2/6
  - Data is being processed at SWRI and here
- Phase 3 testing expected to begin mid-February

Fuel Blending Is On-Schedule

- Test fuel development being done cooperatively by Haltermann and ASD
  - EPA defines fuel recipes
  - Haltermann prepares hand blends, bulk blends and performs fuel analyses
- 16 of the 28 fuels needed in Phase 3 have been or are being blended in bulk
  - 8 have been delivered to SWRI
  - E85 fuel will be obtained from CRC
- The remaining 12 fuels are in hand blend stage
- We expect to have all fuels blended in bulk by mid-February
- This will allow randomization of fuels for Phase 3, as planned

Revised EPAct Fuel Matrix

Phase 3
Base Program (EPA)
(Fuels 1-16) →

Phases 1 and 2
RFS 2 Subset (EPA/DOE)
(Fuels 17-19) →

Phase 3
Additional Fuels (DOE)
(Fuels 20-29) →

E85 (DOE) →

CRC Additional Fuels →

Fuel #	T50 °F	T90 °F	ETOH %	RVP psi	ARO %
1	150	300	10	10	15
2	240	340	0	10	15
3	220	300	10	7	15
4	220	340	10	10	15
5	240	300	0	7	40
6	190	340	10	7	15
7	190	300	0	7	15
8	220	300	0	10	15
9	190	340	0	10	40
10	220	340	10	7	40
11	190	300	10	10	40
12	150	340	10	10	40
13	220	340	0	7	40
14	190	340	0	7	15
15	190	300	0	10	40
16	220	300	10	7	40
17	215	325	0	9	30
18	202	325	10	9	25
19	195	325	15	9	23
20	160	300	20	7	15
21	160	300	20	7	40
22	160	300	20	10	15
23	160	340	20	7	15
24	160	340	20	10	15
25	160	340	20	10	40
26	150	340	15	10	40
27	190	340	15	7	15
28	190	300	15	7	40
29	TBD	TBD	85	TBD	TBD
30	150	325	10	10	40
31	160	325	20	10	15

Revised Fuels

Budget Considerations Going Forward

- Original program cost estimate: $4,271,000
- Cost overrun wrt the original scope of program: **Ex. 4 - CBI**
- Cost overrun including additional projects: **Ex. 4 - CBI**
- ASD staff have worked hard with SwRI to reduce costs while still keeping the program intact

	Program or Project	*Cost*	*Cumulative Cost*	*Difference of Total From the Original Estimate of $4,271,000*	
ORIGINAL PROGRAM	**EPAct Program, April 2008 Cost Estimate**	$ 4,271,000	-	-	-
	EPAct Program, January 2009 Cost Estimate	$ 4,698,100	**Ex. 4 - CBI**		
	Fuel Cost Adjustment	**Ex. 4 - CBI**			
ADDITIONAL PROJECTS	**FTP Testing** (Partially Competed)				
	EFM Resolution (Completed)				
	Fuel Matrix Redesign (Completed)				
	Blending of Two CRC Fuels				
	EmissionTesting of Two CRC Fuels				

Budget Considerations Going Forward (Cont'd)

- Phase 3 cost estimate: **Ex. 4 - CBI**
- Current shortfall: **Ex. 4 - CBI**
- Funds spent or obligated as of Jan. 23, 2009: **Ex. 4 - CBI**
- Phase 3 (Starts in Feb. 2009): **Ex. 4 - CBI**
- Blending and testing of CRC fuels: $301,000

	Program or Project	Date Estimated	Cost		Cumulative Cost	Difference of Total From the Original Estimate of $4,271,000		Comments
			Estimated	Actual				
ORIGINAL PROGRAM	**Whole EPAct Program**	**29-Apr-08** 6-Jan-09	$ 4,271,000 $ 4,698,100	-	-	-	-	**Ex. 4 - CBI**
	Phase 1 (Completed)							
	Phase 2 (Compl. Feb 2009)							**Ex. 4 - CBI**
	Phase 3 (Starts Feb 09)							
	Fuel Cost							
	Fuel Cost Adjustment							uel cost adjustment related to reblending of one fuel, some stranded fuel development work y Haltermann and EPA involvement in test fuel develcpment
ADDITIONAL PROJECTS	**FTP Testing** (Partially Competed)							dditional test program to compare LA-92 and FTP tests wrt ethanol npacts
	EFM Resolution (Completed)							dditional program to enable the use of the Sensors exhaust flowmeter in ne EPAct Program
	Fuel Matrix Redesign (Completed)							tatistical redesign of the fuel matrix
	Blending of Two CRC Fuels							xchange with CRC
	EmissionTesting of Two CRC Fuels							xchange with CRC
		Grand Total >>>	$ 5,413,500		$ 1,142,500	26.8%		

Ex. 4 - CBI

Projected Schedule Going Forward

- Launch of Phase 3 testing: Mid-February 2009
- Completion of Phase 3 testing: Early December 2009
- Reporting: December 2009 – mid-March 2010

		JAN 2009				FEB 2009				MAR 2009					APR 2009				MAY 2009				JUN 2009					JUL 2009				AUG 2009					SEP 2009				OCT 2009				NOV 2009					DEC 2009			
		5	12	19	26	2	9	16	23	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16	23	30	7	14	21	28
Phase 1[a]	14 weeks																																																			
50F setup	3 weeks																																																			
Phase 2[b]	9 weeks	4	5	6	7	8	9																																													
50F teardown	2 weeks																																																			
Phase 3[a]	26 weeks							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26																					
NREL fuels[a]	17 weeks																																	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
CRC fuels	4 weeks																																																		1	2	3
NREL high emitter	2 weeks																																																			
draft final report	6 weeks																																																		1	2	3
EPA/NREL review	4 weeks																																																			
final report	4 weeks																																																			

		JAN 2010				FEB 2010				MAR 2010					APR 2010				MAY 2010				JUN 2010					JUL 2010				AUG 2010					SEP 2010				OCT 2010				NOV 2010					DEC 2010			
		5	12	19	26	2	9	16	23	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16	23	30	7	14	21	28
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Summary of Next Steps

- Complete analysis of FTP cycle effect
  - E15 data is still pending
- Complete Phase 2 testing
  - Analyze and present results for E10 and E15 fuels
- Complete fuel blending and delivery to SwRI
- Perform Phase 3 testing

Additional Slides

Light Duty Exhaust Program Summary

- EPA/DOE collaboration
- Objective: Establish effects of RVP,T50,T90, aromatic content and EtOH on exhaust emissions from Tier 2 vehicles
- Fuel matrix includes 29 fuels + 2 added by CRC = total of 31
- Test Program Design
  - Phase 1: RFS 2 Pilot at 75°F
    - 3 fuels (E0, E10 and E15) tested in 19 vehicles
    - Test results to be available for RFS 2 NPRM
  - Phase 2: RFS 2 Pilot at 50°F
    - Same as Phase 1, except temperature
  - Phase 3: Main Program
    - 27 fuels tested in 19 Tier 2 vehicles, E85 tested in 4 FFVs
- LA92 test cycle used throughout the program
- Species measured: Regulated emissions, CO_2, NO_2, VOCs, ethanol, carbonyl compounds
  - N_2O, NH_3 and HCN by FTIR
  - Some PM and SVOC speciation

Test Fuel Properties

PROPERTY	UNIT	METHOD	FUEL		
			E0	E10	E15
Ethanol Content	vol. %	D5599	<0.1	9.35	14.5
T50	°F	D86	215	209	182
T90	°F	D86	324	319	310
RVP	psi	D5191	9.17	9.05	8.91
Aromatics	vol. %	D1319	29.3	22.9	18.7
Olefins	vol. %	D1319	6.4	5.7	5.6
Benzene	vol. %	D3606	0.48	0.49	0.46
S	mg/kg	D5453	23	23	21
RON	-	D2699	93.4	93.7	93.9
MON	-	D2700	83.5	84.9	84.6
(R + M)/2	-	Calc.	88.5	89.3	89.2

Measured Species

- Bag (phase) level and composite emissions of THC, NMHC, NMOG, CO, CO_2, NOx, NO_2, ethanol and PM
- Bag (phase) level speciated volatile organic compounds (VOCs)
  - Over 200 compounds, incl. alcohols and carbonyls
- Continuous and integrated by bag (phase) emissions of the following species in raw exhaust:
  - THC, NMHC, CO, CO_2, NOx
  - N_2O, NH_3 and HCN by FTIR for a subset of tests
- Semi-volatile and high molecular weight VOC and PM measured in Phases 1 and 2 only